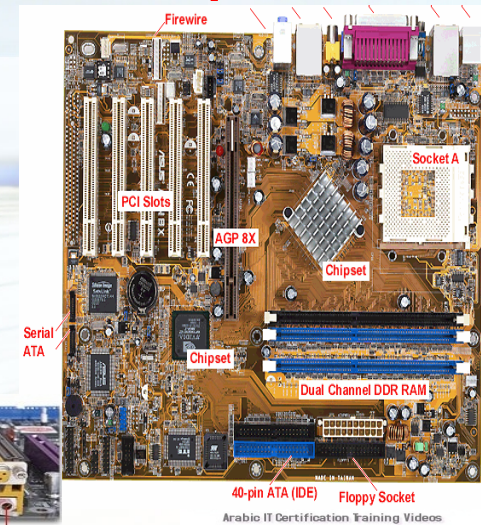


Lesson 2

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System Board Components

- Chipsets
- Expansion slots
- Memory slots and external cache
- CPU and processor slots or sockets
- Power connectors
- Onboard disk drive connectors
- Keyboard connectors
- Peripheral port and connectors
- BIOS chip
- CMOS battery
- Jumpers and DIP switches
- Firmware



Introduction to the concept of a bus

A **bus**, in computing, is a set of physical connections (cables, printed circuits, etc.) which can be shared by multiple hardware components in order to communicate with one another.

A **bus** is simply a circuit that connects one part of the motherboard to another



- A bus is characterized by the amount of information that can be transmitted at once.
- This amount, expressed in **bits**, corresponds to the number of physical lines over which data is sent simultaneously.
- A 32-wire ribbon cable can transmit 32 bits in parallel.
- **"width"** is used to refer to the number of bits that a bus can transmit at once.
- additionally, the bus speed is also defined by its **frequency (expressed in Hertz)**, the number of data packets sent or received per second.
- Each time that data is sent or received is called a **cycle**.

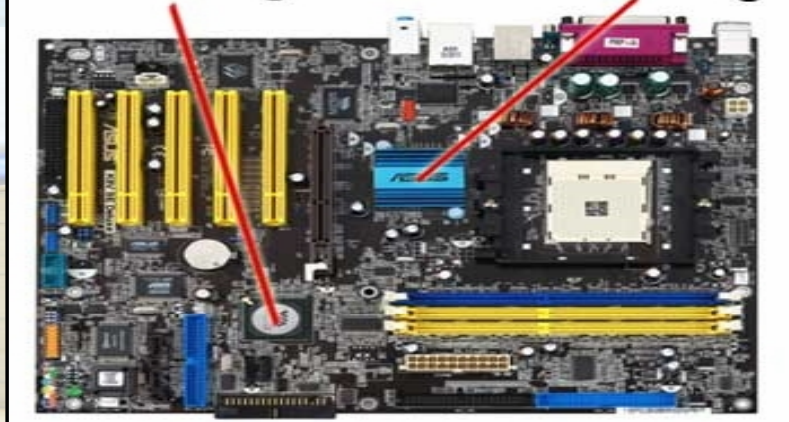
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- maximum transfer speed of the bus, the amount of data which it can transport per unit of time,
- by multiplying its width by its frequency.

Chipsets

- A chipset is a collection of chips or circuits that perform interface and peripheral functions for the processor.
- **"Coproprocessor."**
- Chipsets are usually given a name and model number by the original manufacturer
- in dictating the number, speed, and type of **CPU(s)** and the amount, speed, and type of **RAM** that can be used.
- Intel-based motherboards typically use two chips and the SiS chipsets typically use one.
- integrated circuits designed to perform or control certain tasks.

South Bridge North Bridge



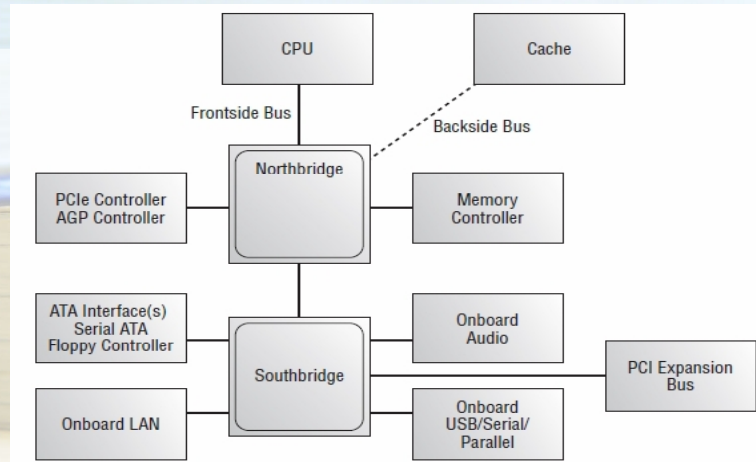
Northbridge Vs Southbridge

The term **bridge** is generally used to designate a component which connects two buses.

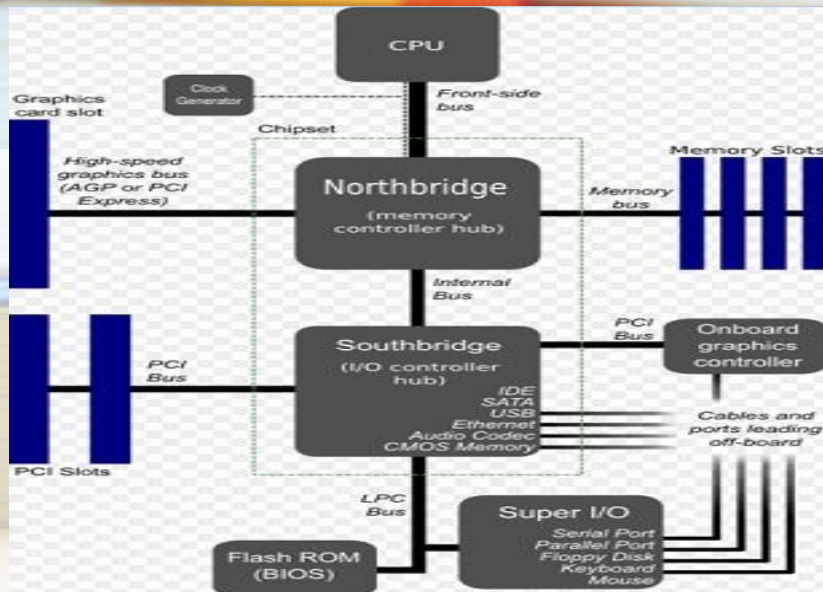
- management of high-speed peripheral communications.
- It typically handles communications among the [CPU](#), [RAM](#), [AGP](#), [PCI-e](#)
- manage the communications between the Southbridge chipset and the rest of the computer.
- responsible for providing support to the myriad onboard peripherals (PS/2, Parallel, IDE, and so on), managing their communications with the rest of the computer and the resources given to them.
- Most motherboards today have integrated PS/2, USB, Parallel, and Serial LAN, audio, infrared, and FireWire (IEEE 1394). When is also responsible for managing communications with the other expansion buses, such as PCI, USB, and legacy buses.

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A typical motherboard chipset



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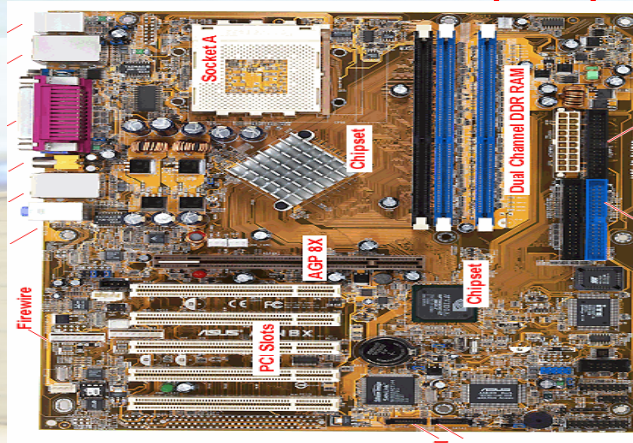
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Expansion slots

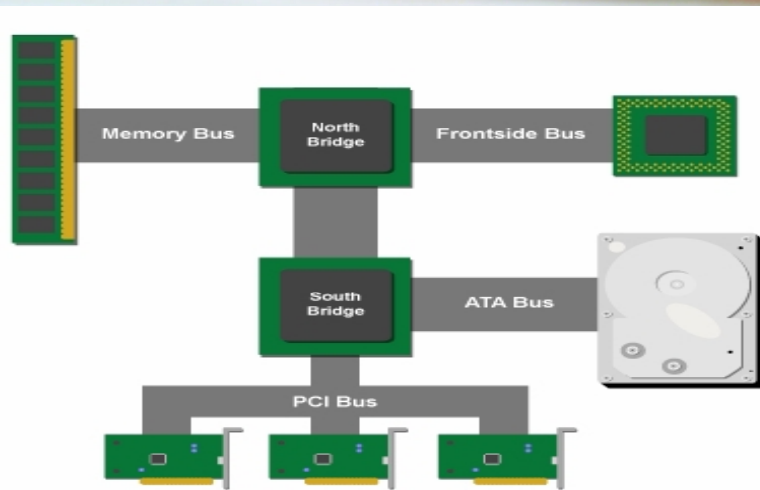
- used to install various devices in the computer to expand its capabilities.
- The main types of expansion slots used in computers today:
 - PCI
 - AGP
 - PCIe
 - AMR
 - CNR

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Peripheral Component Interconnect Bus (PCI).



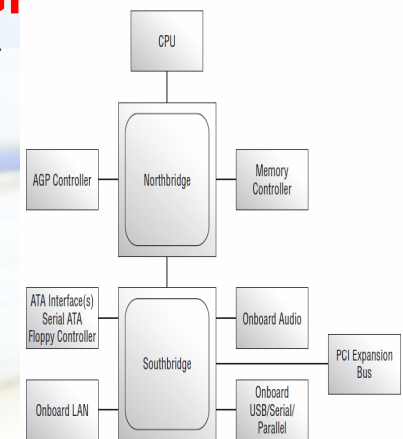
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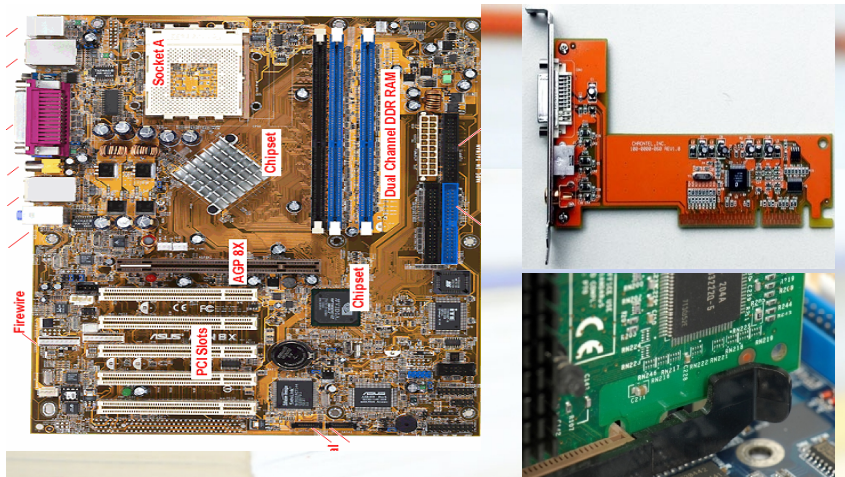
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Accelerated Graphics Port (AGP)

- reserved for use with **video adapters**; no other expansion cards use AGP.
- AGP is a local bus that can pump out video images as much as **eight times faster** than PCI can.
- The port itself provides a direct connection between the video adapter and the system's memory using



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Bus Type	Bus Width (Bits)	Bus Speed (MHz)	Bits per line per cycle	Bandwidth (MBps)
AGP	32	66	1	266
AGP 2x	32	66	2	533
AGP 4x	32	66	4	1066
AGP 8x	32	66	8	2133

PCIe Expansion Slots

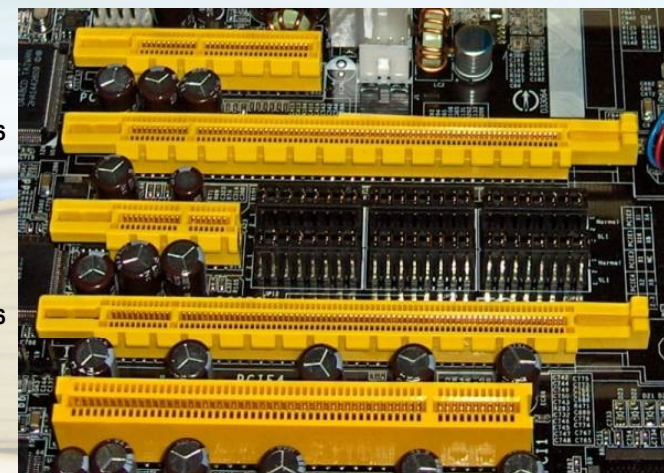
PCI-Express x4

PCI-Express x16

PCI-Express x1

PCI-Express x16

Normal PCI



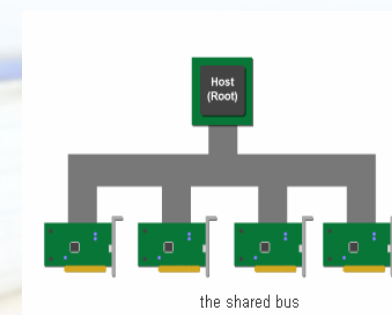
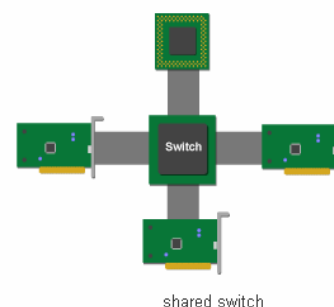
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intro

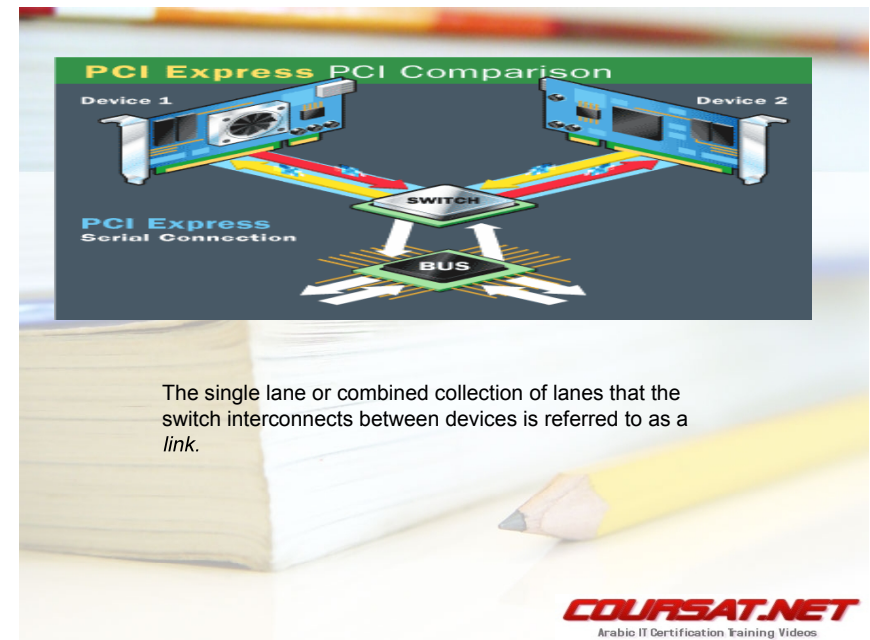
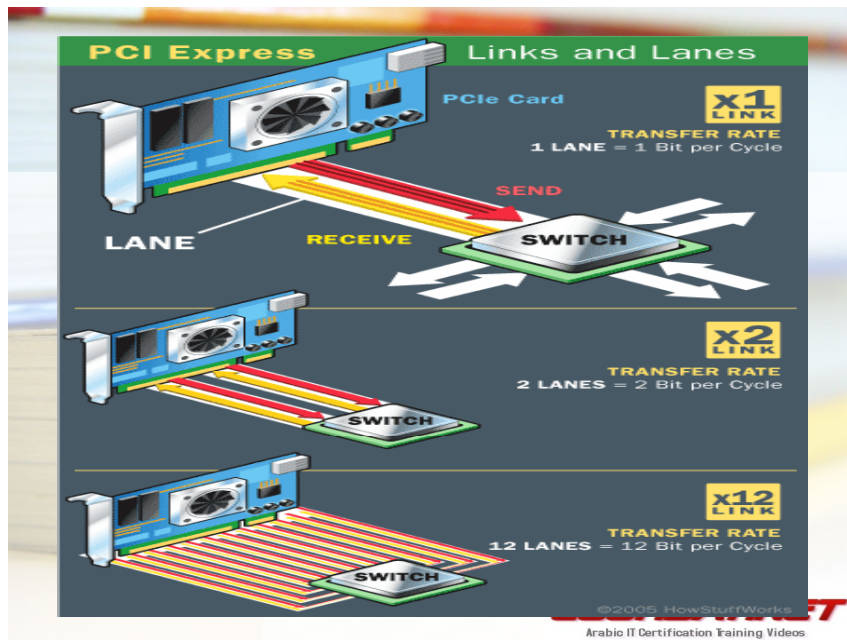
- Introduced by Intel in 2004 designed to replace the older PCI, PCI-X, and AGP standards.
- features of PCI Express**
- Its is a topology based on point-to-point serial links, rather than a shared parallel bus architecture
- PCIe is the current choice of gaming aficionados.

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1-Point-to-Point Serial links VS a Shared Parallel Bus Architecture



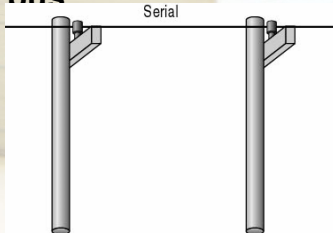
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2-PCIe is a Serial Technology

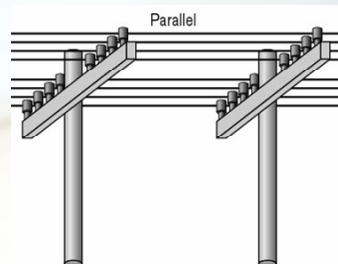
Serial Communication

is the process of sending data one bit at one time, sequentially, over a communication channel or computer bus



Parallel communication

where several bits are sent together, on a link with several parallel channels.



But Now serial is faster than Parallel

- synchronization difficulties keeping the bits aligned in a parallel channel requires more complex electronics.
- Serial Is Less Costly
- It is less costly to design ever faster serial lines than to create and build the necessary circuitry to keep faster parallel channels properly aligned.

PCIe is the current choice of gaming aficionados

- It has the capability of being faster than AGP while maintaining the flexibility of PCI.

Bus Type	Bus Width (Bits)	Bus Speed (MHz)	Bits per line per cycle	Bandwidth (MBps)
PCI-Express 1.0	1	2500	0.8	250
PCI-Express 1.0	16	2500	0.8	4000
PCI-Express 1.0	32	2500	0.8	8000
AGP	32	66	1	266
AGP 2x	32	66	2	533
AGP 4x	32	66	4	1066
AGP 8x	32	66	8	2133

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NVIDIA's Scalable Link Interface (SLI)

- Allow such users to combine preferably identical graphics adapters in neighboring PCIe x16 slots with a hardware bridge to form a single virtual graphics adapter.
- The job of the bridge is to provide non chipset communication among the adapters.
- The bridge is not a requirement for SLI to work, but performance suffers without it.
- SLI-ready motherboards allow two, three, or four PCIe graphics adapters to pool their graphics processing units (GPUs) and memory to feed graphics output to a single monitor attached to the adapter acting as SLI master.
- SLI implementation results in increased graphics performance over single-PCIe and non-PCIe

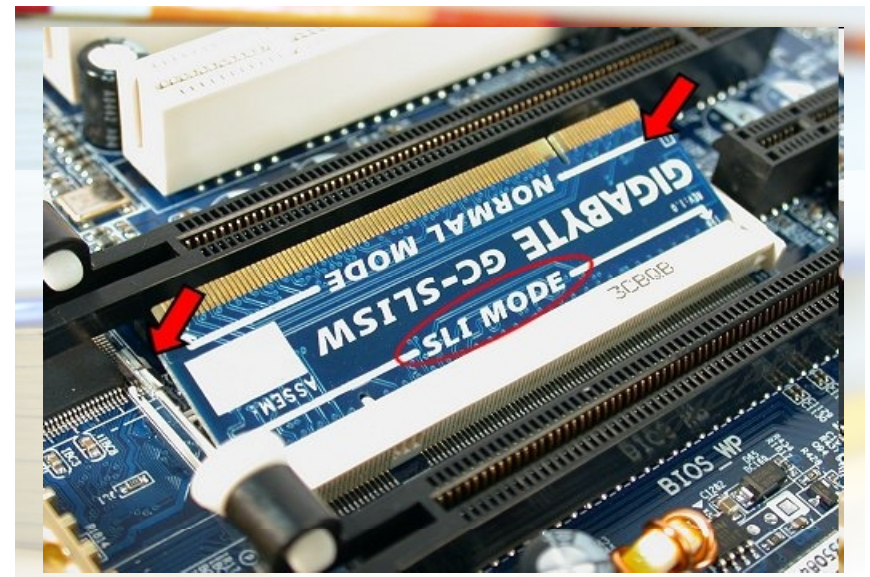
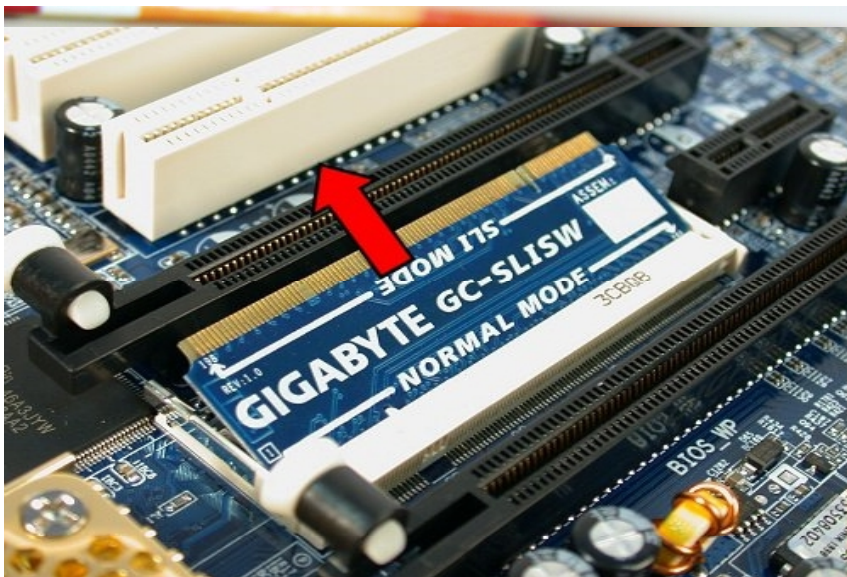
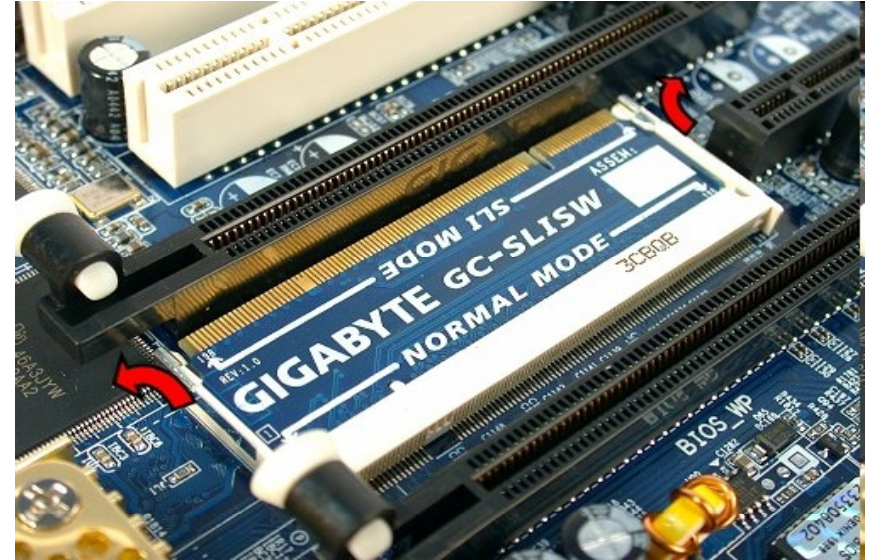
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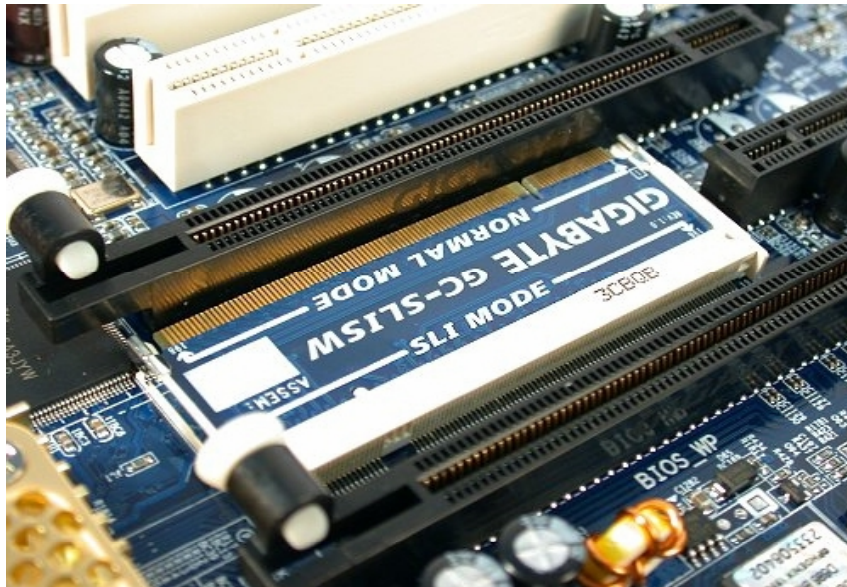


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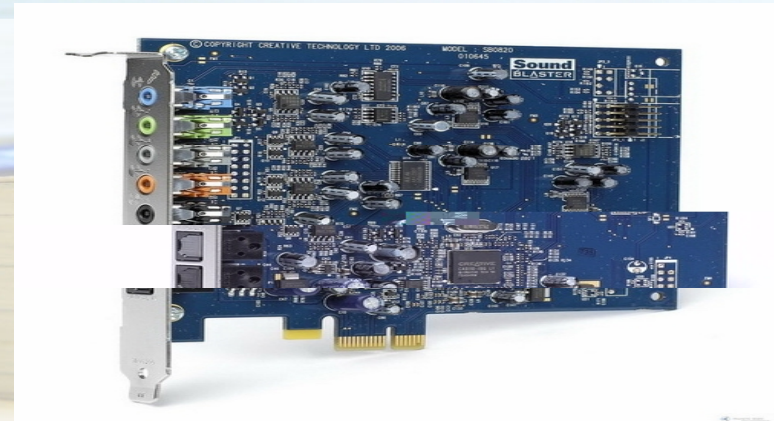


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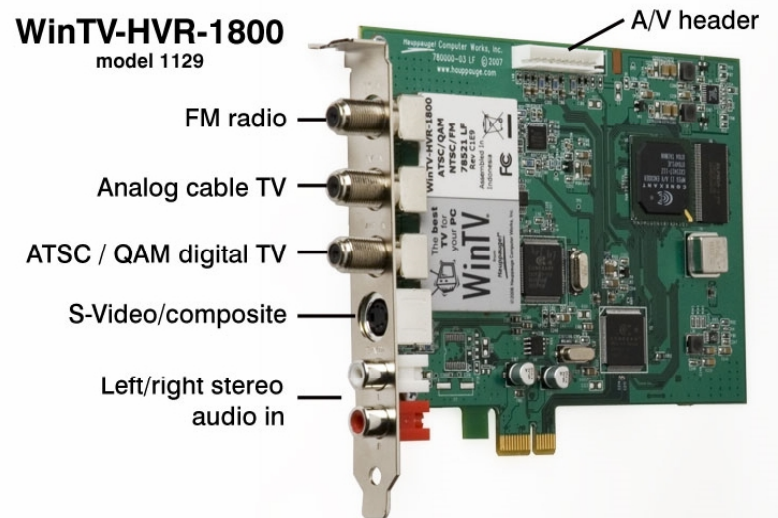
X-FI XTREME - PCI EXPRESS X- FI EXTREME AUDIO



Belkin FireWire 800 and USB 2.0 PCI ExpressCard



WinTV-HVR-1800 model 1129



AMR Expansion Slots

Audio Modem Riser

- It was designed by [Intel](#) to interface with chipsets and provide analog functionality at minimal cost
- The small board is called a *riser* because it rises above the motherboard rather than laying flatly on it. Having this circuitry on a riser means that it doesn't have to be part of the motherboard itself.
- Because getting certification from the FCC(**Federal Communications Commission**) for the manufacture of a new motherboard design is a lengthy process, removing this function from the motherboard provides more flexibility for manufacturers and allows advances in audio modem design to be implemented more easily.
- Physically, it has two rows of **23 pins, making 46 pins total**
- **but OEM system builders ignored it in droves. Why?**
 - Mainly because the AMR slot took the place of a standard PCI slot, and most motherboard designers and system builders rightly preferred having an extra PCI slot to having an AMR slot of dubious utility.
 - The AMR slot also had limited functionality

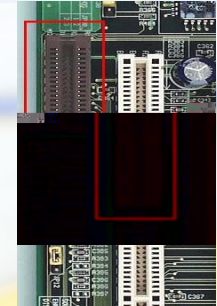


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CNR Expansion Slots

Communications and Networking Riser

- Physically, it has two rows of 30 pins, making 60 pins total
- **Advantages**
- include networking
- support, Plug and Play compatibility
- support for hardware acceleration (as opposed to CPU control only),
- no need to lose a competing PCI slot unless the CNR slot is in



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